hen's egg) can be put in a bottle, whose neck is smaller daily at its extreme eastern and western elongations, $1\frac{1}{2}$ by radiation. To evaporate all the water from a steam than the egg, and have the egg in perfect shape in the degrees from the true north. He could have obtained kettle it will require at least its own (the water's) weight bottle. A. Soften the shell with acetic acid. It may subsequently be hardened by means of lime water.

(7) M. S. asks how the crystals on tin plate are got. I can bring out crystals with acid in the common way, or I can fuse the tinand cool by dashing cold water on it, then applying the acid. The first brings out a large coarse crystal, the second a small square star shape pattern. What I wish is different; it is called acid crystals, to distinguish from the other water crystals. It comes out equally brilliant on each side, as if the whole sheet was dipped in acid. Have triedinitric, mu-riatic, and sulphuric acids, both with salt and sal ammoniac, but without the required effect. A. Dip the warm plate in nitro-muriatic acid diluted with 2 volumes of soft water just long enough to develop the larger figures; then immediately plunge into a large quantity of cold water, after which dip in boiling water, which on removal will cause the plate to dry spontaneously. Lacquer immediately. A similar result is obtained by exposing the plate as it comes from the tin bath, and while the metal is still in a semi-fused condition, to jets of cold air fora few moments.

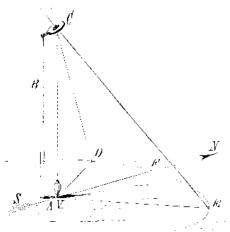
(8) C. A. R. writes: I am putting up electric bells in my house, and the ideas I wish to obtain are these: 1. What kind of battery shall I use in preference to any other? I mean, of course, among the constant condensing. A. The gravity. 2. Which battery would give the strongest current: 2 Leclanche cells, 11/2 pints, 2d size, or 2 Callaud, such as are used in the telegraph offices; and which one of the two would last the longest? A. The Leclanche cells. 3. Will 3 cells of the first battery, or two of the last, be sufficient to work the bells? The wire I have is about No. 24, and the longest stretch from battery to push button and back is about twice 40 or 50 feet. A. Yes, but No. 18 wire would be ratherbetter. 4. What number of wire is generally used for the magnet of house bells, and that of the connections from battery to button? A. Nos. 18 to 24. 5. Can Leclanche cells, I mean the porous cups, be refilled so as to possess the same power as when new? A. Yes. 6. If so, what is the best way to clean them? A. Soak them in stir to incorporate. If the ground is brittle, use more warm water. 7. Must the oxide of manganese be pure, or is it better impure? Should it be powdered fine or coarse (like cracked corn)? A. It should be pure and granulated, or coarsely powdered. 8. Are the zinc rods better when amalgamated or ${\rm net}?$ Must they have a smooth or rough surface? A. They are more easily cleaned if smooth. They should be amalgamated. 9. Can you give me an idea of how I can make myself a small indicator of about 6 numbers? A. Cover each number with a small hinged cover arranged to drop by its own gravity. Hold this cover in place by a small catch. Attach to the catch an armature, and above the arma-in the cleaning after use. How could I obviate this ture place an electro-magnet capable of raising the difficulty? A. Use a very little warm water instead of Attach to the catch an armature, and above the armacatch and the armature. Connect the wires of the magnet with the circuit, closing the device in the door or window to be indicated.

(9) W. L. W. writes: There are several bored salt wells in this section, sunk for drinking water, but cannot be used on account of the salt. One well yields a teacupful of salt to the gallon of water boiled down, say 1 lb. to the gallon. We wish to know if it will pay for the manufacture of salt. It is believed the water supply is inexhaustible at the depth of borings of 110 feet. A. The amount of salt would not permit of profitable working.

ing boiling water, and at the same time soft, elastic, and pliable, used on felt and textiles, etc? A. Try a fustic. Red.-Use tin mordant, and steep in a decoction solution of gum caoutchouc in bisulphide of carbon. of Brazil wood or cochineal or both. Lac, under similar ploded inside of Rogers' Works in Paterson, N. J., in Dry under strong pressure.

(11) J. H. C. asks for the best way to testpotato starch in regard to its quality. A. Microscopic examination is the best and quickest test, the size, shape, and markings of the granules of different kinds of starch rendering their recognition quite easy, as well as distinguishing the starch from foreign matters. See Wagner's "Chemical Technology."

(12) D H. S. writes: My watch having stopped on the 16th day of Nov., and no other timepiece being at hand, I obtained time by the following pro-



(6) C. A. B. asks how an egg (common | ent daily motion of the sun. The pade star is twice his meridian line and by it have set his watch as follows: Set up a stick, A B, and on its end fasten a piece of tin kettle should not be taken to the same steam trap as perforated with a hole. Let the string of a plumb bob the water from the heating apparatus, for the great hang through the center of this hole, and thus get a 1 shrinkage, that is, rapid condensation, due to the steam point in the vertical, marked V in the diagram. About 9 A.M. mark the center of the image of the hole at D. then with the line, A D, as a radius, describe an arc of a to back up and fill the steam space. Theoretically it circle. and when in the afternoon the image of the hole | will take about 21/2 minutes to boil a cubic foot of water, falls on this line, as at E mark, then the line, N S, which assuming all the steam that can pass through a % inch bisects the angle, D A E, is the true meridian.

> (13) W. M. asks what the ingredients are used by Cooper and several ${\scriptstyle \bullet therglue}$ manufacturers to make common glue white. A. Use fine, clear stock, a little alum, steam heat, and vacuum boilers.

> copying ink which you give in your SUPPLEMENT, No. 157, p. 2498, is not intelligible. Please inform me what the symbols 5B, BR, etc., mean. A. The terms are color. 2. Please inform me whether you have pubished a recipe for making the copying pad which is so much used. A. See p. 325, SCIENTIFIC AMERICAN, Vol. 41.

(15) G. H. J. asks: What solution of silver is precipitated in a granular metallic form, by immersing in it a plate of copper? A. Sulphate or nitrate.

(16) H. H. asks for a good receipt for dressing for shoes, such as is sold in bottles under title of "French dressing" for ladies' or misses' shoes. Α. Logwood extract, 6 oz., dissolve in soft water 1 gallon borax, 6 oz., dissolve in soft water 1 gallon, and add 11/2 oz. shellac, boil to dissolve; bichromate of potash % oz., dissolve in soft water ½ pint, and add 3 oz. ammonia water. Mix all together.

(17) W. B. P. asks: What material can I fortify with, in making a copper plate stencil, by allowingnitricacid to "eat out" the letters? A. The etching ground commonly used is prepared by melting together equal parts of asphaltum, Burgundy pitch, and beeswax, beeswax; if it drags, more asphaltum.

(18) D. C. M.-Consult Blodgett's "Climatology," Buchan's "Handbook of Meteorology," Dove's "Law of Storms," Espy's "Philosophy of Storms," Herschel's "Meteorølogy," Karentz's "Meteorology," Lardner's "Meteorology," Morris' "Meteorology," Jenkens' " Use of Barometers," etc.

(19) B. S. writes: I made a copying pad according to directions in your paper, and find it works well, except that the material wastes away very rapidly cold. The gradual wasting is unavoidable.

(20) J. C. L. asks: How shall I proceed to polish copallite to properly show the insects therein? of feet the piston travels per minute, and divide by A. Cut it with a fine saw, and polish with tripoli and a little oil, applied on kid or chamois skin.

(21) R. W. H. asks for a receipt for dyeing billiard balls? A. Black.-Boil in a strong aqueous solution of logwood extract, and then immerse in acetate of iron solution; repeat if necessary. Blue.-Immerse for some time in a dilute aqueous solution of sulphate of indigo partially saturated with potash. Green.-Dip the blued ivory in tin liquor for a few minutes, then in a (10) F. X. W. asks: What substances can hot saturated aqueous solution of fustic; or boil the tive boiler corroded by salt or lye. How is it to be iron in a solution of verdigris in vinegar. Yellow. | mixed? Are you not advising the party to get up a first Use the tin mordant and a hot strained decoction of circumstances, produces scarlet.

> (22) S. G. writes: 1. I am about making an engine to run a scroll saw. It requires about the same power to run the saw as a sewing machine. What would be the proper dimensions for the engine? A. About as small as you can make, say 1 inch cylinder by 2 or 3 inch stroke. 2. Would Babbitt metal be hard enough to make the cylinder? If not, is there any metal softer than iron that would do? A. Yes, but it would wear Use a piece of mandrel drawn brass tabing fast.

> (23) G. A. C. asks: 1. If a steam fire engine feet of hose, the engine running at 150 revolutions a minute will it throw as far 'hussel 1,000 feet of hose. the engine still making 150 revolutions per minute? A. Yes, but it will require much more engine power to overcome the friction of the water in the 900 additional feet of hose. 2. Please name a good work on the steam engine for one who is not a professional engineer. A Bowne's "Catechism of the Steam Engine."

(24) W. H. asks: What is the best selffeeder for low pressure steam boiler (up to 10 lb.)? A. The old Watt water column and float.

corre 6 query, page 123, in your number of February 2 (received to-day), will be corrected, if he brings his return pipe for condensed water from radiators into the boiler below the level of the water. The noises made are due to the struggles between the steam and water, when this pipe is open sometimes to steam, making varying pressure as the quantity of condensed water varies. Havcess: In the evening a board having a straight edge ing suffered myself from this trouble, I completely cor-

in steam to do it, making no allowance for loss of heat of steam. The waste or return water from a steam coming in contact with a large body of water through the sides of the kettle, will cause the condensed water pipe at 30 lb pressure can be utilized in the same time Thus, if you have a 75 gallon kettle it will take 25 minutes to heat all the water to 212° Fah. with steam through a 1/2 inch pipe, making no allowance for transmission through the iron, the slowness of convection of the water, and loss by radiation, and this under the most (14) W. C. writes: 1. The recipe for violet favorable circumstances of piping and trapping. When ebullition begins all the water in a kettle has not yet reached 212°. The baking of about 1% of an inch of mush on the bottom of a kettle, for the want of stirper cooking of the food for 10 hours, and eventually it had to be removed to another and clean kettle.

> (28) R. D. G. asks: 1. Do you know of any gear cutters which can be attached to a lathe? A. There are gear cutters made to be attached to a lathe for cutting small wheels. 2. I would like to know the easiest method for getting the diameter of a wheel when the pitch and number of cogs are given. A. Multiply the pitch by the number of teeth; the product is the circumference of the wheel at the pitch line.

> (29) H. H. & Co., referring to our reply to F. A. S. on p. 124, current volume of SCIENTIFIC AMERI-CAN, write: The Bessemer steel from which railway rails are made contains from 35 100 to 45-100 of one per cent of carbon, and if mould boards and scraper bottoms are made of such steel, they can be hardened. These articles are made every day by all steel works from such material when asked for. Of course the degree of hardness will not be equal to the special plow steels made by the crucible method. Sheet steel for shovels, spring steel for carriage springs, etc., are rolled from Bessemer ingots when buyers require a cheap article.

(30) J. R. asks for a work on steam fitting similar to Mr. Baldwin's "Hints to a young Steam Fitter." A. We do not know of a work exclusively devoted to the subject. 2. What is the best length for a tubular boiler to burn hard coal, 12 or 14 feet; and the best size tube, 31/2 or 4 inch; draught is good. A. If you use 31/2 inch tubes you can make the boiler 12 feet, but with 4 inch tubes it should not be less than 14 feet. In either case it may be made 2 feet longer with advantage

(31) R. C. M. asks (1) for a rule for finding the horse power of engines. A. Square the diameter of the cylinder, multiply the product by 0.7854. Multiply this product by the average pressure of steam per square inch on the piston, and this result by the number 33,000, the quotient is the horse power. 2. What is the rule for finding the horse power of a tubular boiler? A. For a tubular boiler allow 15 to 17 feet heating surface for each horse power. 3. What is the name of the newest and best book on the blast furnace? A. Schinz on "The Action of the Blast Furnace."

(32) J. L. writes: 1. In your issue of February 7, 1880, question No. 1, you advise hydraulic cement properly mixed to stop leaks in legs of locomomixed? Are you not advising the party to get up a first class explosion; one that will make that boiler throw a somersault similar to a locomotive boiler which ex-1852? A. Mixed like ordinary hydraulic lime mortar, small pieces of broken bricks put on to fill up space, there is no danger if the top is kept properly below the fire line. It has been used successfully in a number of cases. 2. What do you consider the best packing or joint for use between cast iron steam dome and top of portable boiler? A rust joint or soft cement composed of lead, oil, and borings, asper "Wrinkles and Recipes," pages 135 and 136? A. If the surfaces are true and faced, use the soft cement; if rough and untrue, make a rust joint.

MINERALS, ETC.-Specimens have been rewill throw a stream a distance of 100 feet through 100 ceived from the following correspondents, and examined, with the results stated:

E. F. B. -- It is pyrolusite-binoxide of manganese. The powdered mineral is commercially known as manganese, also as black oxide of manganese. It is largely used in the manufacture of bleaching powder or chloride of lime (calcium hypochlorite) and in glass making.-S. D.-We cannot judge fairly of the value of your water from so small a sample. The cost of a full quantitative analysis of a mineral water would be about \$100.-M M.-The ore is undoubtedly rich in silver; it is free milling.-J. F. S.-The sample of boiler incrustation consists chiefly of sulphate and (25) P. V. H. writes: I think that the carbonate of lime, oxide of iron, silica, alumina. and or rania (aarbonaaoous) matter The use of small quanti ties of tannate of soda has been found efficacious in preventing the formation of hard incrustations. Filter the water and use the blowout frequently. -W. S. B.-Crystals of rose and amethystine quartz, sometime used in jewelry. They are of little value. No. 2. It is chlorite iu quartz, possibly auriferous. --L. M. C -- They consist chiefly of carbonate of lime with small quantities of clay, quartz, sulphide of iron, and lime phosphate.

INDEX OF INVENTIONS

FOR WHICH Letters Patent of the United States were Granted in the Week Ending

February 17, 1880,

AND EACH BEARING THAT DATE.

[Those marked (r) are reissued patents.]

A complete copy of any patent in the annexed list, including both the specifications and drawings, or any patent issued since 1867, will be furnished from this office for one dollar. In ordering please state the number and date of the patent desired, and remit to Munn & Co., 37 Park Row, New York city.

Aerial navigation, vessel and machinery for, A. L. Barrels. lye conductor for, 1⁻. Jones 224,698 Book, copying, S. Hano..... Boot and shoe tree, J. A. Ambler..... 224,506 Boot and shoe uppers, lasting, G.W. Copeland et al. 224.516

 Boot and shoe uppers, lasting, G.W. Coleland et al. 224.517

 Boot tree, A. W. Cox
 224.517

 Bottle box, J. Matthews (r)
 9.090

 Bottle, nursing, J. E. Potter
 224.557

 Box smoothing iren, J. M. Lemasney
 224.552

 Bracelets, manufacture of, E. W. Webben
 224.552

 Bricks and tiles maching for cutting off. I.S. Smith 204.616

 Bricks and tiles, machine for cutting off, J.S.Smith 224,616 Buckle, harness, I. L. Landis (r)..... 9.088 Bulletin board, L. O. Harris. 224,684 Cane cutter, sugar, P. Seitz Cane shaving machines, attachment for. G. S. 224,733 Colburn..... Cannon, breech-loading, Brannon & Bunting 93-937 Car for common roads, T. T. Prosser .. 224,727 Car, freight, T. T. Prosser...224,726, 224,726, 224,728, 224,(29 Carbureting apparatus, Heywood & Roeklen..... 224,592 Carriage prop block washer, A. S. Parker....... 224,603 Carriage spring, J. R. Locke..... 224,597 A. Bonzon 224,835 Cloth folding and outting machine, G. W. Baker. 224,571 Cloth pr≈ssing machine, E. Gessner (r)......9,076, 9077 Cooking apparatus, steam, E Fox 224,672 E .J. Mallett, Jr. 224,553 Door spring, M. R. Davis 224,584 Door spring, T. Rowe ...

..... 224,730 Drill hole cleaner, pneumatic, J. L. Prentiss..... 224,558 Electric lights, apparatus or treating carbon pen

was leaned against the cabin and aimed at the north star. A plumb line was then suspended from the edge of the board. From the almanac I learned that upon the 17th the sun would fail on noon markat 11:45. The instant the shadow of edge of board coincided with plumb line I set my watch at the time mentioned, 11:45. My companions said the time was too slow, and so it seemed to me. Can the true mean time be obtained in tions are necessary? A. Your failure to get a true

rected it in this way. There is never the least noise now

(26) S. G. M. asks: 1. Can you give me a escription of the Blake transmitter? A. See p. 274, Vol. 40, SCIENTIFIC AMERICAN. 2. Will the Lyons transmitter (described in SUPPLEMENT No. 163) work without an induction coil? A. No.

(27) R. H. J. writes: I have a new steam the manner described above, and if not, what correc- kettle, cast iron, porcelain lined, which is supplied with steam by a 1/2 inch pipe; it is 10 feet from the boiler, meridian line was owing to the fact that the pole star and yet I can scarcely make water boil in it with 30 lb. is only on the meridian twice in 24 hours, and these of steam; what is the matter? A. You send insufficient times change from day to day, by reason of the differ- data, but a few general remarks may throw some light ence of siderial time given by the apparent diurnal on the trouble. To raise water from mean temperature motion of the stars and solar time given by the appar- (39° Fah) to boiling, it requires about one fifth its weight Wood-cutting tool, F. Hanson, Hollis, Me.

English Patents Issued to Americans.

From February 13 to February 17, inclusive.

Anæsthetic compound, P. A. Edison, Menlo Pagk, N. J. Bookstand, F. G. Johnson, Brooklyn, N. Y Dyeing, G. G. Smith, St. Albans. Vt Electric lamp, T. A. Edison, Menlo Park, N. J. Electric light, T. A. Edison, Menlo Park, N. J. Flue cleaner, R. Atherten et al., Paterson, N. J. Gas, manufacture of, H. Y. Attrill et al. New York city. Oil still, E. Watson, Buffalo, N. Y. Printing calico, F. Baylies et al., New YSt city Railroad rails, A. J. Gustin, Boston, Mass. Refrigerating apparatus, S. B. Hunt et al., N. Y. city. Telegraph, electric. B. Thompson et al., Toledo, Ohio.

۱	cils for, W. Sawyer	
	Electric machine, dyname, W. Hochhausen	224,593
	Electrical conductors, induced current guard for,	
ì	C. E. Chinnock	224,580
	Elevator, Bevins & Phillips	224,574
ĺ	Elevator, G. H. Pleasance	224 723
2	End gate, wagon, G. Jontz	224,697
	Extinguisher. W. H. Hovey	224,539
	Fabric striping machine, J. Craig.	
	Faucet, drain, A. G. Class	224,582
	Feather notching machine, A. Wemple	224,564
	Felly bending machine. C. Wright	224,758
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	Fence post driver, J. Carpenter	
	Filter, I. T. Green	
	Firearm, magazine, W. H. Elliot	
	Firearm, revolving, A. Swingle.	
	Firearm sight, R.F. Cook A	
	Fire engine, steam, H. F. Shaw	224,735
	Fire extinguisher, A. M. Granger	224,678
l	Fluids, apparatus for effecting interchange of	
	temperatures of, S. H. Rouart	224,611
	Flush bolt. P. Bradford	224,638
	Fruit gatherer, S. Rice	
	Furnace fire door, Babcock & Wilcox	
	Garbage receptacle, V. Borst	

Scientific American.

Gas meters, automatic safety valve and seal lock Harp, C. E. Holtz 224,536 Harrow tooth, P. A. Peer.... Hat and other head coverings, celluloid, R. H. .. 224,722 Horse detacher, L. B. Shaw 224,6 4 . 224,586
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 Pile, compesite, H. Case.
 224,6%

 Pill making machine, J. A. Whitney.
 224,6%

 Pipe clamp for oil wells, etc., C. Heme.
 224,5%

 Planing machine, metal, S. E. Hildreth.
 224,5%

 Planter, corn, J. F. Hudson
 224,5%

 Plow, G. Watt
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 Plow, R. W. Whitehurst
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 Plow, corn, 24,753

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. 224.543 Joknston

Sewing machines, device for guiding and feeding

straw braid, H. Plummer (r). wing machines, feeding device for straw braid

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 Vaive, balanced slide, J. Fish
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,71 9		

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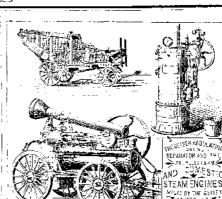
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